
EVALUATING INTERNET AND SCHOLARLY SOURCES ACROSS THE DISCIPLINES

TWO CASE STUDIES

Susanna Calkins and Matthew R. Kelley

Abstract. Although most college faculty expect their students to analyze Internet and scholarly sources in a critical and responsible manner, recent research suggests that many undergraduates are unable to discriminate between credible and noncredible sources, in part because they lack the proper training and relevant experiences. The authors describe two case studies from different disciplines (psychology and history) that offer a variety of strategies instructors can use to help students learn to critically evaluate and analyze Internet and scholarly sources.

Keywords: *critical evaluation, history, Internet sources, psychology, scholarly sources*

Although undergraduates increasingly rely on the Web for general and academic information, studies have shown that many college students cannot—or choose not to—discriminate between credible and noncredible online information resources (Davis 2003; Metzger, Flanagin, and Zwarun 2003). This common lack of

discrimination, coupled with the ease of acquiring information online that is neither monitored nor checked for quality or accuracy, has caused great concern among educators (Gandolfo 1998; Metzger, Flanagin, and Zwarun).

Whereas the problem of using technology to deliberately cheat (e.g., handing in a paper obtained online) and to commit obvious plagiarism (e.g., cutting and pasting chunks of online text without citation) has been well addressed in the literature (Martin 2005; Purdy 2005; Scanlon 2003; Snapper 1999), far less has been written about the problem of

unintentional online plagiarism and the inability of students to critique, evaluate, synthesize, and credit online sources properly. Indeed, studies have shown that students actually evaluate online sources differently than published refereed print sources, because they are not aware, or do not understand, that online information often does not have a systematic editorial review process, as found in traditional media channels (Davis 2003; Flanagin and Metzger 2000).

In a recent study of 1,041 undergraduate Internet users, Flanagin and Metzger (2000) found that respondents generally believed that Internet information was as credible as information acquired from radio, television, and magazine sources, but was somewhat less credible than information from newspapers, regardless of the type of information sought (e.g., news, reference, entertainment, or commercial). Even more problematic, the participants reported that they rarely verified Internet information, and if they did, their verification process was easy to perform and relied on their opinion (e.g., to decide if information was up-to-date and complete). Fewer respondents engaged in more rigorous and active verification behaviors, such as verifying an author's credentials or qualifications (Flanagin and Metzger).

Moreover, the blending of factual and commercial information on the Web can make it difficult for people to distinguish between advertisements and reliable information, a factor that further

Susanna Calkins is the associate director of the Searle Center for Teaching Excellence at Northwestern University. Matthew R. Kelley is an assistant professor in the department of psychology at Lake Forest College.
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inhibits establishing the credibility of online sources (Alexander and Tate 1999; Metzger, Flanagin, and Zwarun 2003). Even the results generated by search engines such as Google are derived from little understood algorithms that allocate relevancy based on the number and importance of pages linked to a Web page, which can result in disproportionate or heavily biased references favoring a certain author, organization, or point of view (Stapleton 2005).

Librarians were among the first to recognize the problems posed by online information—particularly the ability of anyone with knowledge and access to Web page construction to “publish” their own Web pages—by creating criteria to effectively evaluate Web sites (e.g., Harris 2000; Stapleton 2005). Because Web pages still have few of the conventionalized standards found in traditional print sources, the questions first posed to Web users a decade ago are still crucial today in verifying online information (e.g., Who is the author? What authority does the site have? How current is the information? What is the intended audience? What agenda, if any, does the author have? Is the content biased? [Stapleton 136]).

As the Internet has become more accepted as a source of research information (Stapleton 2005; Young 2005)—indeed the American Psychological Association, Modern Language Association, and Chicago style manuals have had citation methods for online information for several years now—some faculty have begun the process of teaching students to critically evaluate and assess Web pages. Whereas there is no one set of standard guidelines to evaluate Web information for research purposes, most have used some form of the evaluatory questions established by librarians (as listed above).

We present here a pair of case studies, drawn from courses in two separate disciplines at a small private liberal arts college located in the Midwest, that were designed to foster critical evaluation of Internet and scholarly sources. The first case study describes a series of active-learning and discussion activities employed during the second week of a sophomore-level psychology course on research methods and statistics. The second case study describes a semester-

long research project in a freshman-level world history course. Although the details of each case are discipline specific, teachers from a wide variety of fields should be able to easily adapt these activities and assignments for their own courses by incorporating relevant discipline-specific content with the general principles and frameworks offered below.

Case Study One

In the past decade, few psychological phenomena have generated as much popular excitement, or as much misinformation, as the Mozart effect (e.g., Rauscher, Shaw, and Ky 1993; Steele, Bass, and Crook 1999). The Mozart effect refers to Rauscher, Shaw, and Ky’s finding that listening to a Mozart sonata for ten minutes will temporarily enhance a person’s spatial-reasoning abilities (specifically, an eight-to-ten-point improvement on a spatial IQ task). Interestingly, the current “popular” conception of the Mozart effect bears little resemblance to these original findings. Indeed, a recent Google search revealed more than 74,000 Web sites devoted to the “Mozart effect,” many of which suggest that listening to Mozart will produce long-lasting improvements in general intelligence, concentration, speech, and language abilities. Given the apparent differences between the scholarly and popular definitions of the Mozart effect, the abundance of Internet and peer-reviewed sources, and the sustained level of interest in this topic from the general public, this phenomenon provides an effective backdrop against which students can develop their critical evaluation skills.

The current laboratory activity was implemented in an undergraduate-level research methods and statistics course and required three hours for completion (a two-hour lab session followed two days later by a one-hour lecture session). Twenty students were enrolled in the course and the course was taught in an Internet-enabled computer laboratory with twelve computers, which required the students to work in pairs. The activity consisted of a variety of in-class experiential and active learning tasks, small- and large-group discussions, and out-of-class readings and assignments.

At the beginning of the laboratory session, I (the second author) instructed the class that our goal for the day was to examine how music affects a child’s brain. When asked how one could begin to answer this question, several students suggested that we conduct an Internet search. We performed a Google search that yielded 367,000 results, on the first page of which was a link to an undated article by Don Campbell conveniently titled “How Music Affects Your Child’s Brain.” Students were divided into pairs and were asked to spend the next twenty-five minutes reading though the brief article and then discussing with their partner a series of six questions that I had prepared as a handout. The questions (see table 1) were modeled after those used by Connor-Greene and Greene (2002) in their guide to reading Internet reports.

Following the think-pair-share task, we reassembled for a full-class discussion of the article and the questions. Students readily noted problems with the author’s lack of credentials on the title page and

TABLE 1. Discussion Questions for “How Music Affects Your Child’s Brain”*

1. After reading this article, what advice, if any, would you give to a friend with a young child?
2. Does the author make a convincing case that listening to Mozart will benefit the lives of children?
3. Are there any “red flags” that lead you to question the credibility of this article? (Make a list on a separate piece of paper—to be turned in at the end of class)
4. What is the nature of the evidence presented by the author?
5. Does the evidence warrant the conclusion that listening to Mozart will benefit the lives of children?
6. How would you evaluate the credibility of the claims in this article? What sources of information would be useful in this process?

Note. * Campbell (2005).

the scant source citations throughout the text. They also mentioned that the article read more like a sales pitch than a scholarly work. Indeed, once they reached the fourth page of the article, they discovered that they could learn more about the Mozart effect in Mr. Campbell's book, *The Mozart Effect for Children: Awakening Your Child's Mind, Health and Creativity with Music* (2000). Still, despite these red flags, many students remarked that the article was consistent with what they had heard informally about the Mozart effect and that they would recommend that their friend's children listen to Mozart on a daily basis—after all, as one student commented, “It [listening to Mozart] can't hurt and could possibly help the kids.” The discussion concluded after one hour of the laboratory session.

After a brief break, the second hour of the lab began with a fifteen-to-twenty-minute discussion of the CARS checklist for evaluating research sources (Harris 2000; see table 2). CARS is an acronym designed to help students remember four important attributes of a reliable source: credibility, accuracy, reasonableness, and support. For each part of the acronym, the class was asked to generate a list of characteristics and questions that would indicate whether a source was credible, accurate, and so on. For instance, when assessing credibility, the class noted one should consider the author's credentials (e.g., level of education, experience, employer, position, and reputation) and whether there were any indications of poor quality control (e.g., poor grammar, misspellings). In the event that students failed to generate segments of the checklist (e.g., evidence of peer review), I asked them pointed questions in an effort to draw their attention to the missing infor-

mation (e.g., “If you were a journal editor, how might you ensure the credibility of a manuscript?”).

This session was followed by a fifteen-to-twenty-minute discussion of Varnhagen and Digdon's (2002) tips for reading empirical research reports. Varnhagen and Digdon suggest that students ask separate sets of questions as they read each section of a research paper. For instance, when considering the methods, students should evaluate the appropriateness of the research design, the measures, the participants, as well as whether the study was completed ethically. As in the previous session, asking students which questions they thought were important to consider as they read the article drove the discussion.

Following the CARS and reading-tips discussions, students returned to their computers and were given an opportunity to practice searching for books and articles in the online library catalog and the PsycInfo database. I briefly introduced students to the use of keywords, operators, and limits in these databases and asked them to locate sources using a variety of different search strategies (e.g., author, title, journal, keyword). In addition, students learned how to access electronic journals and how to order materials through an interlibrary loan.

Near the end of the session, I assigned a homework assignment in which students were asked to imagine that they were going to write a research paper on the Mozart effect using only six sources. Their goal, then, was to find the six most relevant, reliable, and valid sources by searching the abstracts listed in the PsycInfo database. They were asked to (1) create an American Psychological Association-style reference page by using the model included in their textbook (Stangor 2004), (2) provide annotations for

the sources in which they briefly described the important aspects of the article, and (3) indicate why they chose the article instead of another source. Furthermore, I gave students two short Mozart effect articles that offered opposing arguments (Rauscher, Shaw, and Ky 1995; Steele, Bass, and Crook 1999;) and instructed them to critically read the articles, using the guidelines we discussed in class, and to generate at least four questions, comments, or critiques of the articles.

We began our next session, two days later, with a brief pair-share activity in which sets of two students compared their reference pages with one another and explained the rationale behind their chosen sources. As expected, there was considerable variability among the students' article choices. Some students opted for only the most recent research, arguing that they were only interested in work on the “cutting edge,” whereas others employed a more balanced approach and selected a few of the original, early works as well as the more recent research. As a class, we considered the advantages and disadvantages to various search and selection strategies (e.g., the pitfalls associated with relying solely on secondary accounts of research, such as misinterpretation or corruption of an article's original meaning). Next, we turned our attention to the two articles that were assigned as homework. We systematically evaluated each article using the Varnhagen and Digdon (2002) guidelines and concluded the session by revisiting the six questions (table 1) that I (the second author) originally posed to the class when they read the original Internet article by Campbell (2005).

Although formal evaluations of these activities were not gathered, we saw the benefits of these evaluation activities indirectly in subsequent research projects over the course of the semester. A qualitative analysis of the work submitted by students in the case study group, as compared with prior non-case study students, revealed systematic differences between the groups. Case study students appeared to be more cognizant of the sources that they chose and they tended to include background information on their sources in subsequent projects, despite the fact that this was not explicitly required by the assignments. These students also were more likely to include only peer-

TABLE 2. The CARS Checklist for Evaluating Research Sources

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| <ol style="list-style-type: none"> 1. Credibility <ul style="list-style-type: none"> • Author's credentials, evidence of quality control, evidence of peer review 2. Accuracy <ul style="list-style-type: none"> • Timeliness, comprehensiveness, audience, and purpose 3. Reasonableness <ul style="list-style-type: none"> • Fairness, objectivity, moderateness, and consistency 4. Support <ul style="list-style-type: none"> • Source documentation or bibliography and corroboration |
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Note. Adapted from Harris (2002).

reviewed sources in their papers, and their sources reflected a better balance between original, older sources and recent sources. Moreover, these students were more likely to go to the library to find articles in bound journals and did not rely solely on electronically available sources. Finally, the case study students showed a tendency to exceed the “source limit” for a given project—presumably because they better realized the importance of the other relevant sources of information that was available for their projects. Overall, the current series of activities seemed to effect lasting changes in students, abilities to critically evaluate, choose, and use Internet and scholarly sources.

Case Study Two

For many historians, the Internet looms great both in promise and dilemma. On the one hand, searchable databases (e.g., Worldcat, Articlefirst), academic search engines (e.g., Google scholar), and online museum and library reference systems have brought obscure sources out of the shadows in a way that scholars even twenty years ago could barely have imagined. Online journals, discussion boards, and Listservs have simultaneously broadened and tightened scholarly and communal bonds around the world, bringing exposure and scrutiny to documents and ideas previously examined only by a privileged few. Every day, more and more primary sources and precious documents of all sorts become available to the public, to the delight and chagrin of the researcher and educator. The delight comes from the availability and abundance of the virtual sources, the wariness from the frequent—and agonizing—lack of accompanying context, description, and reference. A translation of Confucius’s *Analects* may be a joy to behold for the non-Chinese speaker, but who is to say that the interpretation is appropriate in context, tone, or syntax?

In research and in teaching, then, the potential of the Internet is great, as is the challenge. In my (the first author) introductory world history course, I sought to address this challenge by asking my students to undertake a Web-based research project. The students—most of whom were in their first or second semester of college—were asked to critique a his-

torical Web site by comparing the content, arguments, and thesis with that found in scholarly printed journals and monographs. As I found out from an informal survey administered at the beginning of two separate semesters, most students had never been asked to critically examine a Web site before, even though they all alleged to be quite proficient with accessing information on the Internet. In the survey, I asked my students to gauge how they determined if a Web site was credible, legitimate, and appropriate as a scholarly source. Most of them reported that they judged the credibility and authenticity of a Web site by its overall look and professional quality (e.g., correct grammar and spelling, lack of profanity), but very few indicated that they ever looked for the Web site’s author or thought about potential biases.

Each semester, I asked students to write an eight-to-ten-page paper in which they were to develop a thoughtful thesis on a subject that interested them from the period our class covered (3000 BCE to 1650 CE). Students were instructed to critically evaluate the theories, arguments, and knowledge found in one academic Web site (such as those published by reputable museums or universities) and in three scholarly journals and books. The goals of the essay were threefold: (1) to have students grapple with—and learn deeply from—an engaging historical question, (2) to teach students how to evaluate the relative merits of different scholarly arguments, and (3) to encourage students to be discerning consumers of Web-based information.

After they decided on a topic, their first assignment for the project was to select a Web site and their three scholarly sources on the subject, due in the fifth week of a sixteen-week semester. To help them find a credible Web site, I provided them with a detailed handout that asked them to select a Web site from a well-known reputable source, such as a library, museum, center, or respected news source (e.g., BBC; A&E; The History Channel). I asked them to scrutinize the URL, the domain of the Web site address, and the stated credentials of the author or institution. They were to assess whether the site was someone’s personal Web page and whether the site contained references and links to other reputable sources of infor-

mation. I asked them to consider if the material appeared to be sloppy or poorly presented and whether the tone seemed scholarly or casual or if the author or institution seemed to have an overt agenda or bias. I also asked them to evaluate the graphics and images on the Web site.

Across the semesters, I found that many students struggled considerably with finding an appropriate historical Web site, despite the lengthy guidelines that I provided, even though most were able to procure scholarly print sources fairly easily. As students sent me potential Web sites via e-mail, at times I was incredulous over what they believed was a scholarly source. In one of the more extreme examples, a student sent me a link to a white supremacy Web site that explained why Vikings were naturally superior to other medieval tribes. Somewhat understandably to the untrained eye, the Web site looked superficially scholarly in content and tone, with detailed descriptions of maps, weapons, and folklore. Yet, when I asked him to think a little more critically about the headings, Web site address (“white power”), and general content, he was shocked and apologetic when he realized the opinions advocated by the authors. Another surprise came when students wanted to review historical Web sites clearly intended for junior high students and even for children. More commonly, several students selected Web sites that had been clearly created by undergraduates at other institutions, which my students had deemed valid and credible, simply because these sites contained the “.edu” suffix in their domain.

Once we agreed on adequate Internet and scholarly sources, I asked students to analyze and compare their sources by creating worksheets that guided them through a series of questions (see table 3). After I provided feedback on their worksheets, students used the worksheets as a guide to writing their papers, critiquing the Web site and comparing the Web site with the arguments and evidence found in the scholarly published texts. In their critical essays, students were asked (1) to analyze the content of the Web site (including what had been omitted or ignored), (2) to assess the viability of the content by comparing it with the three scholarly journal articles or books on the same topic, (3) to analyze

TABLE 3. Selections from Historical Source Evaluation Worksheet

Question of interest:

- E.g., Why / How was X significant in Y culture? What effect did X have on Y?

Preliminary thesis

- To create a viable thesis, you might be able to simply invert your question and add “because.” For example: X was significant in Y culture because; or X had several important effects on Y, including . . . (1), (2), and (3).

Evaluating three scholarly sources (answer questions separately for each source)

- Put reference in appropriate CMS bibliography format.
- Who is the author? (Is he or she an academic? What field? Can you see any obvious or more subtle biases?)
- What is the author’s point of view about your topic? How does this author answer your question? (Offer a brief overview of general contents)
- What is the author’s evidence? (Archeology? Poetry? Weapons? Tapestries?) Is this a different kind of evidence from the other sources?
- What, if anything, do you find compelling about this argument/perspective/point of view?
- Why do you plan to use this source to help you write your paper?
- How does this author’s perspective differ from your other sources? (Or, how is it similar?) Identify three points of comparison.

Evaluating the scholarly Web site

- Put reference in appropriate CMS bibliography format.
- Briefly describe content and structure of the Web site
- Who created the Web site and why? Can you see any overt or subtle biases?
- How well does the Web site address your question?
- How does the Web site compare in substance and tone with your scholarly texts?
- What makes the Web site valid? What gives the Web site its legitimacy?
- Does anything detract from the Web site’s validity?
- How would you evaluate the overall strengths and weaknesses of the Web site (e.g., navigability, useful links, graphics, visual interest)?

Note. CMS = *Chicago Manual of Style*.

the perspective of the author(s) (including any overt or subtle biases), and (4) to evaluate the overall strengths and weaknesses of the Web site (e.g., navigability, useful links, graphics, visual interest). At the conclusion of the paper, students were asked to explain what advantages or disadvantages (or limitations) they perceived in using Web-based information for historical analysis and research.

Of the four objectives listed above, students seemed to have had the most trouble with analyzing the content of the Web site, comparing online information with that found in printed scholarly sources, and analyzing the theoretical perspective of the author. Except for a few of the more gifted students, most could not identify the finer arguments and theoretical underpinnings of any of the scholarly sources (printed or online) without direction from me. Many compared the texts at a fairly superficial factual level in their first drafts, although their analyses became more sophisticated with my guidance. However, the majority of the students analyzed the overall

strengths and weaknesses of the Web site well in the first draft, and almost all spent a lot of time tracking down the Web site author and affiliation. A few even corresponded directly with the authors by e-mail, and asked them questions about the Web site content, showing an initiative that surprised and delighted me. In their written reflections, too, a clear majority of students commented favorably on the process of finding, evaluating, and commenting on a Web site related to a topic that interested them. What I found then, overall, is that this research project promoted active learning and critical thinking and significantly improved my students’ abilities to analyze both online and printed sources for their scholarly content.

Implications

A nationwide study conducted in 2004 revealed a deep ambivalence in the academy toward the educational impact of the Internet (Young 2005). Nearly half (42 percent) of the 2,316 faculty members surveyed believed that the Internet had

affected student work negatively, citing a worsening in the quality of student writing and an increase in plagiarism. At the same time, 94 percent of the surveyed faculty members allowed students to use Internet sources for assignments. This marked ambivalence suggests that faculty members may be trying to embrace the Internet but are dissatisfied with the results when students are allowed or even encouraged to use online sources in their projects. In short, we seem to expect our students to use the Internet in a responsible way, but we are not necessarily providing the relevant guidelines and, even more important, the relevant experience that allows them to apply those guidelines in practical ways.

The approaches that we took in our respective courses are meant to suggest different strategies that instructors can take to help students analyze online sources critically and responsibly. For students to learn to analyze and interpret online sources with any skill, they must be called on to critically evaluate sources with regularity. One assignment given by one professor during a student’s term at college is not enough. What students learn about assessing online materials in one course should be reinforced across the curriculum and disciplines. As part of our ethical and academic commitment as educators, we must help our students develop their abilities to analyze and evaluate information, whether accessed online or in print, to foster a life-long commitment to critical inquiry.

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